Chapter 5:
Human Health

Key issues:

1) Drinking water protection
2) Spill prevention and control
3) Fish consumption advisories
4) Beach closures
5) Beach monitoring and assessment

Our Goals:

- Water is safe for drinking.
- Water is safe for swimming.
- Fish and wildlife are safe to consume.

Lake St. Clair and the St. Clair River provide a safe supply of drinking water to more than 5 million residents in Michigan and Ontario, and are among the most heavily used recreational areas in the Great Lakes for fishing, boating and swimming. Many people on both sides of the U.S.-Canada border are concerned about the potential health risks associated with pollutants in these water bodies. These concerns are underscored by beach closures and fish consumption advisories, as well as potential threats to drinking water. The causes for these public health concerns vary, but citizen response is unified: people want full use of local water resources without risks to their health.

The pollutants that raise public health concerns can be broadly divided into two categories:

- Long-term persistent chemicals
- Disease-causing bacteria and viruses.

These pollutants can threaten human health if people

- Drink contaminated water
- Eat contaminated fish
- Swim in contaminated water

Substantial progress has been made in reducing and eliminating the amount of pollutants in the watershed. In addition, various measures (advisories, beach closures, drinking water treatment, etc.) have been adopted to protect human health against commonplace pollutant issues that have not been resolved or are in the process of being resolved. However, the need to minimize or eliminate human health threats at the source, including identifying and addressing the cause of beach closures and fish consumption advisories, still exists. In addition, it is recognized that current measures to protect human health may not be successful in extraordinary situations such as in response to accidental spills, deliberate dumping (whether historical or new) and acts of terrorism. In this regard, the need to identify and manage intermittent or extraordinary threats, either by eliminating the source of the threat or installing measures to protect against the threat, as in the case of early detection and/or notifications systems, is emerging.

The following pages contain information about these human health concerns, identify key issues, and provide recommendations.

Drinking Water

Access to safe drinking water is essential to good health. Management of the drinking water resource requires the continuation of current measures that address drinking water threats as well as the addition of new measures designed to address emerging and extraordinary threats.

A variety of contaminants can threaten drinking water, including microorganisms such as bacteria and viruses, and organic and inorganic chemicals. These contaminants can come from a variety of sources, including commercial and industrial facilities, storm sewers, impermeable surfaces such as roads and parking lots, residential yards, golf courses, failing septic systems, combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), air deposition and farm fields. See Chapter 3 for a detailed discussion on these various sources of pollution.

Microbial bacteria and viruses can cause illnesses ranging from gastrointestinal disorders to severe, life-threatening diseases. Chemical contaminants can have many effects, ranging from dermatitis and hair loss to cancer, nervous system problems, bone disease, and developmental problems in children. Chapter 3 provides more details regarding sources and causes of contamination.

Number of water intakes in the U.S. and Canada

	U.S. Intakes	Canadian Intakes
St. Clair River	7	3
Lake St. Clair	4	5

Both the river and the lake provide drinking water, through public water supplies located both in the United States and Canada, to residents throughout Macomb, Oakland, St. Clair, and Wayne counties in Michigan as well as Ontario, Canada. Lake St. Clair and the St. Clair River are considered to be safe sources of drinking water relative to commonplace threats.

There are several mechanisms in place to ensure the safety of drinking water, including:

- Pollution prevention
- Water treatment
- Monitoring

Preventing pollution from entering the source water is the currently acceptable way to protect drinking water and helps reduce the need for costly treatment. (Source water is untreated water from streams, rivers, lakes, or underground aquifers that is used to supply private wells and public drinking water.)

If contaminants do enter source waters, the contaminants are removed when the water is treated at public water supply facilities. This type of management depends on properly designed, operated and maintained public water systems

Water treatment plants on the U.S. side routinely treat for pathogens and suspended materials. The plants also have the ability to treat for additional chemical contaminants. However, this measure is dependent on notification of a spill or deliberate act that could impact source water at its intake point. Monitoring for unexpected or out of the ordinary source water threats is not in place.

The communities of Mt. Clemens and Grosse Pointe Farms, Michigan, operate with installed granular activated carbon filters as a routine part of their water treatment process. Mt. Clemens also has the ability to initiate ozone treatment that will also be a

part of the treatment process at the DWSD Water Works Park II intake when the new plant becomes operational. in . The remaining plants along the river and lake all have the ability to add powdered activated carbon to the treatment system. In addition to being able to remove many chemical pollutants as part of the treatment, typically the water treatment plants would shut down their intakes and operate on stored water until the plume from the spill passed by the intake.

Ontario water treatment plants regulations include standards for microbiological, chemical and radiological parameters. These plants are not equipped specifically to deal with toxic chemicals; any treatment in this regard is incidental.

These control measures , when properly applied, reduce the risk of contamination to drinking water supplies. If any of these "lines of defense" are compromised, the risk of contamination increases. If water supply entities have difficulty meeting regulations and providing safe water, assistance and enforcement mechanisms are in place to address the issues. Monitoring is a fundamental requirement to ensure safe drinking water. Water is monitored at the source, at the treatment plant, after it has been treated, before it is delivered to the consumer, and at the consumer location

Fish Consumption

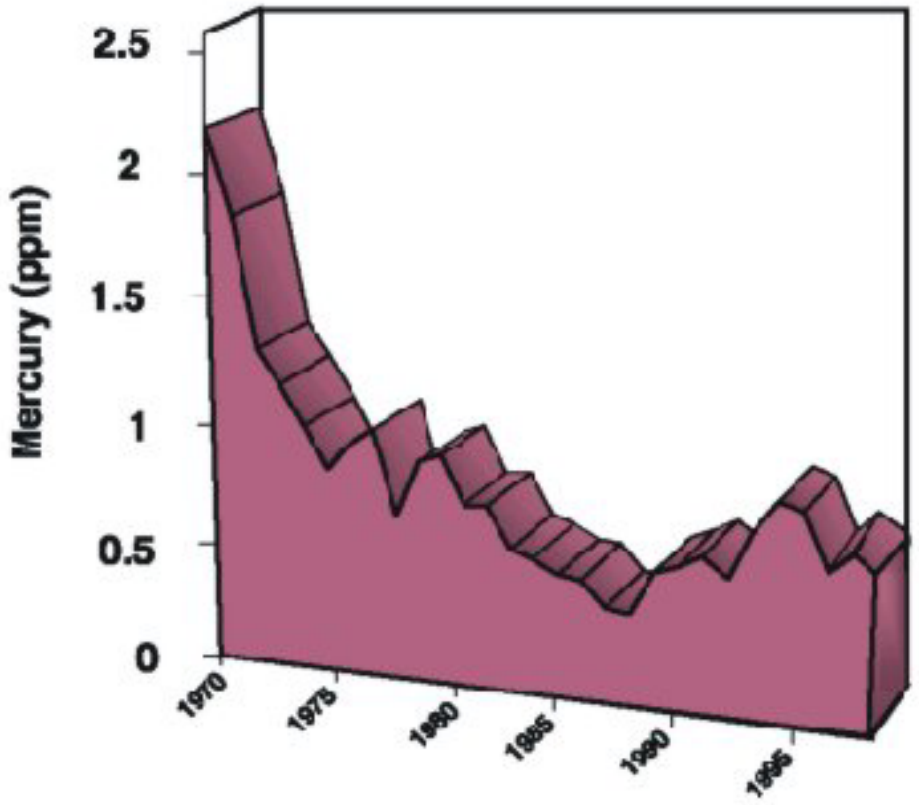
Did you know...
Bioaccumulation occurs when toxic chemicals settle to river or lake bottoms where they are consumed by bottom-dwelling microorganisms and small fish. These smaller creatures are consumed by larger fish, which are, in turn, eaten by larger fish, waterfowl, and humans. In this manner, toxic chemicals move through the food chain, building up to dangerous levels in higher predatory animals, including humans. These toxic chemicals can cause cancer, birth defects, and mental and physical deformities.

Contaminants that impact fisheries originate from both point and nonpoint sources and include organic and inorganic chemicals. Eating fish taken from the Great Lakes can result in exposure to long-term persistent toxic chemicals. In 1970, following the discovery of excessive levels of mercury in fish taken from Lake St. Clair, Michigan became the first state to issue a fish consumption advisory. In the same year, commercial fishing was banned in Ontario waters of Lake St. Clair due to high levels of mercury in sediments and fish. These high levels of toxic chemicals were attributable to the unmanaged release of chemicals into both the water and air by accidental spills, deliberate dumping, or the byproduct of industrial or municipal activities. These contaminants settle into sediments.

This is one of the issues that prompted passage of federal, state, and provincial regulations, such as the 1972 Federal Water Pollution Control Act in the United States and the Canadian Environmental Protection Act that include methods to control further introduction of these contaminants. Due to the resultant regulations relative to contaminant releases, as well as the cleanup of historic releases, substantial progress has been made to eliminate and/or reduce the source of chemicals that lead to fish consumption advisories. As a result, contaminant levels in fish have declined. These improvements led to the reopening of a limited commercial fishery in the Canadian waters of Lake St. Clair in 1980. Test results throughout the watershed indicate a trend toward declining levels of fish contamination. Figure 5-1 shows the decline in mercury levels in Lake St. Clair walleye between 1970 and 1995.

Although industrial releases, including air releases are now regulated, and efforts have been underway to clean up sites of significant contamination, the legacy of the historic releases, contaminated sediments, is now considered an ongoing source of contamination from within Lake St. Clair and the St. Clair River

Figure 5-1: Mercury levels in Lake St. Clair walleye



Source: Ontario Ministry of Environment

In this regard, the remediation of contaminated sediments is an important step toward delisting the St. Clair River as an Area of Concern (AOC), and thus a key objective of the St. Clair River Remedial Action Plan (RAP). In addition, local, regional and global contamination sources, including air, accidental spills and deliberate dumping, continue to be a significant concern in the Lake St. Clair watershed relative to overall ecosystem health. These sources contribute to the restrictions, and fish consumption advisories will remain in effect until persistent toxic chemicals in fish are reduced to levels considered safe for public health.

Beaches

For more information...
Current updates and historical data sets for *E. coli* analysis within the U.S. portion of the watershed are available at www.deq.state.mi.us/beach

Lake St. Clair and the St. Clair River are blessed with abundant shoreline that provides substantial recreational benefits to the local residents and tourists who enjoy nine public U.S. beaches and four public beaches in Canada. In general, there is good water quality for swimming in Lake St. Clair and the St. Clair River. However, in both the United States and Canada, beach closures due to elevated bacteria levels continue to be a problem at most beaches and must be addressed.

Beach closures occur when levels of *Escherichia coli (E. coli)* bacteria are elevated to a point that they exceed water quality standards. *E. coli* bacteria are an indicator of human sewage or feces from warm-blooded animals that carry disease-causing microorganisms. *E. coli* bacteria can get into waterways from CSOs, SSOs, failing

onsite sewage disposal systems (OSDSs), illicit connections, stormwater runoff, agricultural runoff, industrial sources and municipal discharges. Health problems that can result from exposure to elevated *E. coli* densities in water include gastrointestinal disease, and respiratory, ear, eye, and skin infections.

While significant progress has been made to identify and address sources of contamination, beach closures continue to be a problem at most sites in the United States and Canada. Identifying and controlling sources of pollution are critical steps in addressing beach closures. It is important to frequently monitor beaches and notify the public of contamination as well as identify the sources and causes of this contamination. Further, it is important that research continue on the development of reliable and quick testing and analysis methods to shorten the lag time between determining if a problem exists and public notification.

Beach closures will continue until all sources of bacteria are controlled, particularly illicit connections, leaking septic systems, sewage overflows, and agricultural runoff from poultry and livestock farms.

Findings and Recommendations

The following pages review major findings and recommendations regarding the key human health issues in the Lake St. Clair watershed. These issues include:

- Drinking water protection
- Spill prevention and control
- Fish consumption advisories
- Beach closures
- Beach monitoring and assessment

The U.S. recommendations regarding Lake St. Clair are presented as part of this management plan. Canadian recommendations for Lake St. Clair will be developed following public review of and input into the management plan. In addition, the St. Clair River has a set of binational goals and objectives that were established as part of the binational St. Clair River RAP (see www.friendsofstclair.ca).

Many Lake St. Clair issues are already being addressed, at least in part, by existing efforts to mediate problems in the watershed tributaries and the Great Lakes. Both public input and existing objectives will be important in developing the binational recommendations for Lake St. Clair.

Drinking Water Protection

Potential source of drinking water contamination in U.S.:
- industrial discharges;
- waste disposal sites;
- municipal storm sewers; wastewater treatment plants; and
- nonpoint source runoff

Drinking water from the St. Clair River and Lake St. Clair is safe but potentially vulnerable to bioaccumulative materials, chemicals from agricultural runoff, emerging issues related to microbial and chemical contaminants, as well as out of the ordinary events such as spills or deliberate contamination.. The lake and its watershed must continue to be protected to ensure a continued safe source of drinking water.

United States: Source water can be contaminated by a variety of inputs to the watershed, including industrial and commercial discharges, waste disposal sites, municipal storm sewers, wastewater treatment plants, and nonpoint source runoff. The pollutants originating from these sources are largely regulated under a variety of

federal and state laws. The larger concern is when pollutants are either accidentally or unknowingly released from these sources. Such releases are some of the greatest threats to the quality of source water, along with boating- and shipping-related spills in the lake and river.

Weather can also threaten the quality of source water, and has traditionally been viewed as the most significant variable in source water protection. Storms in Lake Huron can cause sediment resting at the bottom of the lake to resuspend and flow into the St. Clair River. This condition is known as "turbidity." Rainstorms can also increase stormwater runoff and tributary inputs to the lake, and thus increase lake and river turbidity. Water treatment plants are designed to remove these sediments and pollutants that bind to them.

Monitoring programs continue to indicate that there are localized turbidity problems at municipal water intakes due to the shallowness of the lake and resuspension of sediments due to wind and storm conditions. Generally, the overall quality of the intake water is excellent. Continued efforts to improve waste management and wastewater treatment as well as remediation of historic pollutant sources would help limit any potential sources of contamination. In addition, development and installation of real-time chemical and biological monitoring mechanisms would protect the municipal water treatment plants from unanticipated changes in water quality due to accidental or deliberate introduction of chemical or biological contaminants.

Canada: Routine monitoring and sampling of Canadian drinking water show that Lake St. Clair and the St. Clair River are considered good water sources for public water supplies. However, agricultural chemicals and nonpoint sources of pollution have been detected in source waters. Raw water (source water that has not yet been treated) taken from Lake St. Clair and the Sydenham River has shown an impact from agricultural activity and nonpoint sources. With the exception of periodic high nitrate concentrations in the Sydenham River, no health related drinking water guidelines were exceeded. Preventing pollution from these sources of contamination is critical to protecting drinking water and reducing the need for costly treatment.

In the early 1990s, zzebra mussels caused concern for Canadian municipal and industrial water supplies. The growth of zebra mussels in water treatment plant pipes threatened to impair the ability of the plants to produce adequate supplies by restricting the quantity of water that could be transported through the intake pipes. Equipment was installed at most municipal intakes to deal with this potential problem.

Spills are a concern on both sides of the border, as they can compromise the quality of source water and can cause long-term negative impacts on the sediment and habitat within the watershed. A more detailed discussion of spill prevention and control is provided below and additional information is provided in Chapter 3.

Programs and Initiatives

The following section describes specific programs and initiatives on each side of the border related to drinking water protection, followed by U.S. recommendations for drinking water protection.

United States: The Michigan Department of Environmental Quality (MDEQ) has regulatory oversight for all public water supplies in the State of Michigan. MDEQ also

enforces the Federal Safe Drinking Water Act under the authority of the Michigan Safe Drinking Water Act, investigates contamination of drinking water wells, and oversees remedial activities at sites of groundwater contamination affecting drinking water wells.

Public water suppliers routinely monitor treated water for an extensive list of physical, microbial, and chemical contaminants. Bacteria are generally monitored on a daily basis and monitoring for specific chemical contaminants varies from quarterly to annually depending on the particular parameter. These parameters are monitored in the final water after treatment rather than the raw water supply before treatment. The water treatment plants in the U.S portion of the watershed will generally monitor their raw water intake daily/continuously for turbidity, pH, chlorine demand, and temperature as an indicator of the overall water quality.

In 1997, the U.S. Environmental Protection Agency (U.S. EPA) issued guidance to assist states in developing source water assessment programs**.** MDEQ and the U.S. Geological Survey (USGS) developed Michigan's Source Water Assessment Program (SWAP), which U.S. EPA approved in 1999.

Currently, efforts are underway under Michigan's SWAP to:

1) Identify areas that supply public drinking water;
2) Inventory contaminants and assess water susceptibility to contamination; and
3) Inform the public of the results.

MDEQ will use these assessments to develop future monitoring programs for public water supplies. The assessments will also provide data for local, voluntary source water protection programs.

The effect of flow velocity and wind is a unique aspect of source water assessments. Weather has traditionally been viewed as the most significant variable impacting the quality of untreated water. Lake St. Clair's round shape and shallow depth make it highly susceptible to the effects of wind, as well as water level changes that occur in the St. Clair River. As part of the SWAP, MDEQ is working with the USGS to develop a flow simulation model of the St. Clair-Detroit river corridor to help assess the susceptibility of public water supply intakes to contaminants.

For more information…
A public inquiry into the Walkerton incident produced numerous recommendations regarding the protection of public water supplies in Ontario. A report with the full set of recommendations is available online at Ontario government web sites.

Canada: Provincial governments have the primary responsibility for managing and protecting water quality, including drinking water regulation. The federal government is responsible for ensuring the safety of drinking water in areas of federal jurisdiction, such as national parks and First Nation reserves.

In May 2000, the need for safe water supplies was highlighted by the events in Walkerton, Ontario. *E. coli* from agricultural sources contaminated the municipal well water. This situation was compounded when the public water supply was treated with inadequate levels of chlorine before it was released to the public. This mismanagement of the water supply resulted in seven deaths and more than 2000 illnesses. The tragic event underscored the need for safe water supplies. In response, the Ontario government passed new drinking water regulations (Regulations 459/00 and 505/01) that clarified requirements for treatment, testing and reporting associated with waterworks.

Under these regulations, owners and operators must report incidents when drinking water quality does not meet the provincial drinking water quality requirements. The

Ontario Ministry of Environment (MOE) posts "Adverse Drinking Water Quality Incidents" reports at their web site, along with the actions taken to resolve the issues. An "adverse water quality incident" is a generic term that refers to any unusual test result, including aesthetic problems such as foul taste and odor. An "adverse water quality incident" does not mean that a drinking water supply is unsafe. In addition, the operating authority for each plant must prepare a quarterly report summarizing all water quality information. The reports must be submitted to the MOE and made available to the general public.

The public inquiry into the Walkerton incident produced numerous recommendations for protecting public water supplies. Based on these recommendations, Ontario has enacting a Safe Drinking Water Act (SDWA) that consolidates legislation and regulations relating to water treatment and distribution. In June 2002, Ontario passed the Nutrient Management Act as an important part of the watershed protection regime envisioned by the Commissioner for the Walkerton Inquiry. The report also recommended establishment of watershed-based Source Protection Plans (SPPs) to help safeguard drinking water supplies. The Ontario government has developed a framework for these plans.

Human Health
Candidate Management Plan Recommendations for Actions in the U.S. Watershed:

Drinking Water Protection

5-1. Complete and implement Source Water Assessments to ensure effective protection of raw drinking water supply sources

5-2. Require monitoring programs for public water supplies to assure rapid detection of variations in water quality due to spills, contamination, and other factors

5-3. Revise existing notification and response plans to assure source water protection from contaminants associated with spills and runoff events

5-4. Support long-term funding for existing Lake St. Clair weather buoy.

Spill Prevention and Control

Spills continue to raise concern in the region, despite a significant overall reduction in number and size of spills in recent years. In 1991, the St. Clair River Remedial Action Plan (RAP) identified restrictions on drinking water consumption as one of the beneficial use impairments for the St. Clair River Area of Concern (AOC); this was due primarily to spills from chemical industries affecting downstream domestic water supplies.

There have been no mandated water intake closures due to spills on the Canadian side of the St. Clair River since 1994, and on the U.S. side since the late 1980s. The 1997 St. Clair River RAP *Update Report* stated that drinking water was no longer considered impaired. The St. Clair River RAP 2000 *Progress Report* states that the number of land-based spills to the Canadian side of the St. Clair River has continued to decline from 135 in 1986 to less than ten per year between 1998 and 2001.

Spill reduction in recent years is due primarily to programs implemented by industries on both sides of the border and increased regulatory efforts by state, provincial, and

federal agencies. The number of spills has decreased greatly over the past decade. An important aspect of protecting drinking water is that spills be reported and that incidents crossing or having the potential to cross the international border be reported in accordance with state/provincial, federal and international mandates. The continued diligence on the part of industries and other potential spills sources within the watershed will be needed to maintain the current level of spill prevention and control.

Programs and Initiatives

Two plans mandate the procedures and mechanisms for a joint binational notification and response to spills of oil or hazardous substances. The first is Annex I of the Canada-United States Joint Marine Pollution Contingency Plan (CANUSLAK), which was mandated under Annex 9 of the Great Lakes Water Quality Agreement. The second is Annex III of the Canada-United States Joint Inland Pollution Contingency Plan (CANUSCENT). Each of these plans establishes fundamental procedures for timely notification and coordinated and integrated response at the federal level of each government.

Individually, both the United States and Canada have existing mechanisms in place to respond to and manage the actions required during an oil and hazardous substance spill at the federal, state/provincial, and local level.

United States: The following legislation provides the mandate for federal response to protect the environment in the event of an environmental emergency:

National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321-4347: NEPA is the basic national charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy (http://epw.senate.gov/nepa69.pdf).

The Clean Water Act (CWA), 33 U.S.C. s/s 121 et seq. (1977) as amended by the Oil Pollution Act of 1990 (OPA), 33 U.S.C. 2702 to 2761: OPA streamlined and strengthened EPA's ability to prevent and respond to catastrophic oil spills and established a trust fund financed by a tax on oil to clean up spills when the responsible party is incapable or unwilling (http://www.epa.gov/region5/water/cwa.htm).

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), 42 U.S.C. s/s 9601 et seq. (1980) as amended by the Superfund Amendments and Reauthorization Act (SARA), 42 U.S.C.9601 et seq. (1986): Superfund created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment (http://www.epa.gov/region5/defs/html/cercla.htm).

Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U.S.C. 5121, et seq.: The Federal Emergency Management Agency (FEMA) has been delegated primary responsibility for coordinating federal emergency preparedness, planning, management, and disaster assistance functions. EPA supports these activities under Emergency Support Function (ESF) #10, Hazardous Materials Annex to the Federal Response Plan (FRP) (April 1999). The FRP may be viewed at http://www.fema.gov/rrr/frp/.

In addition, federal interagency coordination at responses and in preparation for potential responses is largely controlled through the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). State and federal interaction at responses in Michigan are delineated under the Region 5 Regional Contingency Plan (RCP).

In Michigan, spill response is mandated under the Michigan Emergency Management Act and can bring in the combined efforts of MDEQ, Michigan Department of Natural Resources (MDNR), Michigan State Police and others.

At the local level, police and fire departments will most likely be the first responders and will act as Incident Commander.

Canada: The Ontario MOE handles spills that originate from land-based sources, excluding those that are under federal jurisdiction (as outlined below). The provincial Environmental Protection Act and Ontario Water Resources Act require that spills be reported. MOE has a Spills Action Centre (SAC) to receive spill reports and determine appropriate responses.

Environment Canada is responsible for providing the environmental, scientific and technical advice for emergency events in Canada. Reporting requirements under the Canadian Environmental Protection Act 1999 and the Fisheries Act call for spills/releases from marine, international, interprovincial, First Nation and federal facility land-based sources to be reported to Environment Canada. Its duties also extend to federally managed resources such as fish, birds and wildlife protected under the Fisheries Act and Migratory Birds Convention Act, and may include supporting joint response operations when requested by outside agencies.

The Canadian Coast Guard (CCG) deals with spills from marine vessels, boats and ship fuelling facility spills in navigable waters, as well as spills from unknown sources. The Pollutant Discharge Reporting Regulations under the Canada Shipping Act requires that spills from ships and designated oil handling facilities be reported. The CCG staffs a Regional Operations Centre to deal with incident reports. Information is stored in a Marine Pollution Incident Reporting System (MPIRS) and is also communicated on to the MOE Spills Action Centre and to Environment Canada.

For more than sixteen years, the St. Clair River has had a continuous water quality monitoring system maintained by the Sarnia-Lambton Environmental Association (SLEA). This monitoring station, located near Courtright, Ontario, provides information on river water quality and provides continuous real-time spill detection and protection for downstream water users. This automated system samples river water once per hour, analyzing it for twenty volatile organic compounds common to chemical industry operations. This monitoring system is intended to provide information on river water quality. Since it is not directly located at a drinking water plant intake, the monitoring system does not directly evaluate drinking water quality, but the sensitivity of the monitoring system allows for detection of small quantities of compounds that might be discharged from Canadian land-based sources. Thus, it provides an important warning system for downstream water plants.

Binational: Formal cross-border notification procedures have been adopted and are implemented through the U.S. National Response Center and the Canadian National Environmental Emergencies Centre, as well as the Ontario Ministry of the Environment Spills Action Centre and the Emergency Management Division of the

Michigan State Police. The United States Coast Guard and the Canadian Coast Guard have similar working arrangement and share information with the provincial and state agencies. Water treatment operators also use an informal reporting system. A water intake operator who hears about a spill, or is impacted by an unknown spill, immediately calls the next facility on the "notification list" who in turn calls the next facility, and so on.

Existing consulting and coordinating bodies established to execute and plan for emergencies include:

- International Joint Advisory Team (established under CANUSCENT)
- Joint Preparedness Team (established under CANUSLAK)
- Region 5 Regional Response Team (mandated under the auspices of the U.S. National Oil and Hazardous Substances Pollution Contingency Plan)
- Canadian Regional Environmental Emergencies Team (providing multi-agency, multi-disciplinary advice to the federal responders)
- Southeast Michigan Area Committee (mandated under the CWA as amended by OPA).

Each of these bodies can provide scientific expertise and organizational resources to a response in a timely manner.

In addition, through the planning activities and documents of each group, the exercise regimen required under each plan, the additional statutory requirements of CERCLA and CWA, and such regulatory mandates as the Spill Prevention, Control and Countermeasures regulation, preparedness and prevention against oil and hazardous substance spills are prioritized.

Human Health
Candidate Management Plan Recommendations for Actions in the U.S. Watershed:

Spill Prevention and Control

5-5. Formalize the current, informal reporting and notification process used by water treatment operators

Fish Consumption Advisories

Since the 1970s, fish consumption advisories due to chemical contamination, including PCBs and mercury, have declined throughout the watershed. However, because of their ability to bioaccumulate and persist in the environment, PCBs and mercury continue to be an ongoing public health concern.

Each fish advisory contains information on the species and size of fish, recommended consumption (how often each fish can be eaten), the chemical contaminants covered by the advisory, the location of the waterbody under advisory, and may also include information on the population subject to the advisory. Tables 5-1 and 5-2 summarize the fish consumption advisories that are currently in place within the watershed. These tables do not contain specific information about size, consumption frequency, or population-specific consumption advice.

Table 5-1: U.S. Fish Advisory Notices

Waterbody	Fish Species	Contaminant(s)
Lake St. Clair	bluegill, carp, channel catfish and sturgeon	PCB
	brown bullhead, carpsucker, northern pike, and white perch	Mercury
	largemouth and smallmouth bass, muskellunge, walleye and white bass	Mercury and PCB
St. Clair River	Walleye	PCB
	carp, gizzard shad and freshwater drum	Mercury and PCB
Clinton River (Below Yates Dam)	carp, rock bass and white sucker	PCB

Table 5-2: Ontario Fish Advisory Notices

Waterbody	Fish Species	Contaminant
Lake St. Clair	walleye, northern pike, smallmouth bass, largemouth bass, white perch, white bass, rock bass, black crappie, brown bullhead, channel catfish	Mercury
	carp, white sucker, quillback carpsucker	PCB
St. Clair River		
Upper	walleye, yellow perch, rock bass, white sucker	Mercury
	lake trout, carp	PCB
Middle	walleye, northern pike, rock bass, freshwater drum, white sucker, redhorse sucker	Mercury
	chinook, carp, gizzard shad	PCB
Lower	walleye, northern pike, yellow perch, rock bass, bluegill, freshwater drum, white sucker	Mercury
	carp, gizzard shad	PCB
Thames River*	smallmouth bass, largemouth bass, rock bass, carp, white sucker, walleye, freshwater drum	Mercury
Sydenham River	northern pike, walleye, black crappie, white bass	Mercury

*Summary for nine locations along the Upper and Lower Thames River

Fish advisories and other such guidelines are the current solution to curbing public exposure to these chemicals and protecting human health. These advisories, if followed, are thought to successfully address the human health aspect of the problem of bioaccumulative and persistent chemicals in the environment. However, advisories do not provide a solution to the actual contamination issue. Reducing both regional and global sources is a proactive solution. Current research supports the need for continued reductions in the levels of persistent toxic chemicals. In addition, continued research is needed on how persistent toxic chemicals impact human health. Continued and enhanced public education and outreach regarding risks and benefits of fish consumption are also important.

Programs and Initiatives

Currently, both Michigan and Ontario administer comparable fish consumption advisory programs to help people choose fish that are the least contaminated.

United States: The Michigan fish consumption advisory program is administered by the Michigan Department of Community Health (MDCH), which publishes a *Michigan*

Fish Consumption Guide. The MDCH advises extra caution among women of childbearing age and children under 15 (see Table 5-3). They also recommend caution depending on fish size, species, and the location where it is caught.

Canada: The *Guide to Eating Ontario Sport Fish* provides advice on the consumption of fish taken from Ontario's lakes and rivers. The guide, which is jointly produced by the Ontario MOE and the Ministry of Natural Resources (OMNR), incorporates test results from about 1,700 provincial locations. The fish consumption advisories are based on Tolerable Daily Intake (TDI) values developed by Health Canada and other environmental factors such as air, drinking water, and potentially contaminated food sources. Both the TDI and the consumption advice provide for a higher level of protection for women of childbearing age and children (see Table 5-3).

Table 5-3: Trigger levels used by Ontario Agencies and the MDCH to establish fish consumption advisories

Chemical	MDCH	Ontario
Total Chlordane	0.3 ppm (=mg/kg)	0.05 ppm
Total DDT	5.0 ppm	5.0 ppm
Dieldrin	0.3 ppm	0.1 ppm
Dioxin Toxic Equivalents*	10.0 ppt (= ng/kg)	10.0 ppt
Heptachlor (+ Heptachlor Epoxide)	0.3 ppm	0.1 ppm
Mercury		
Restrict consumption	0.5 ppm	0.45 ppm
No Consumption	1.5 ppm	**
Mirex	0.1 ppm	0.07 ppm
Total PCB		
General Population	2.0 ppm	0.5 ppm
Women of Child Bearing Age & Children Under 15 Years		
1 Meal Per Week	0.05 ppm	**
1 Meal Per Month	0.2 ppm	**
6 Meals Per Year	1.0 ppm	**
No Consumption	1.9 ppm	**
Toxaphene	5.0 ppm	0.2 ppm

*The MDCH and OMOE advisory trigger level for dioxin applies to total 2,3,7,8-TCDD toxic equivalent concentrations.
**Ontario trigger levels are the concentrations above which, women of childbearing age and children under 15 are advised not to consume any fish. The maximum consumption for this group is 4 meals per month (~1 meal per week) up to the trigger level. The general population is advised to consume restricted quantities of fish (from 0 to 4 meals per month depending on concentration) above the trigger level.

One of the greatest sources for mercury and PCB within the watershed appears to be from atmospheric deposition, possibly from sources far removed from the watershed. Another source is the residual mercury and PCB contamination within the sediments of the Lake St. Clair watershed. There will need to be a constant source reduction in North America and around the world to address atmospheric deposition within the watershed. Continued reductions in emissions of PCB and mercury within the Lake St. Clair watershed should be pursued as part of this broader effort. Industrial pre-treatment programs in place throughout the watershed need to be strengthened to assure that any local sources of mercury - such as hospitals, dental facilities, and laboratories - control the discharge of mercury from their sites to the storm or sanitary sewers to meet water quality standards.

In the early 1970's, the USACE began disposing of sediments, contaminated with mercury, and dredged from the Lake St. Clair commercial navigation channel, into

confined disposal facilities. The USACE estimates that its maintenance dredging activities have removed more than half a million cubic yards of contaminated sediment from the system. Recent sampling in the watershed has found detectable levels of mercury in sediments at sites along the commercial shipping channel. These mercury concentrations may be the result of historical contamination from upstream sources, or a combination of historical contamination and ongoing air deposition of contaminants. The current distribution along the shipping channel may be the result of daily shipping traffic, as well as recreational boating and weather events that disturb the sediments. In any case such disturbances routinely expose the mercury to the environment. Periodic maintenance dredging of the shipping channel may also disturb these sediments although the effect would be insignificant given the 5-year plus maintenance schedule in comparison to the daily disturbances. Additional studies are needed to determine the specific spatial distribution of these contaminated sediments and to develop a remediation program to alleviate any environmental impacts from these sediments.

Additional sources for PCB contamination are associated with historic contamination sites such as landfills and spill locations and "first flush" runoff from sites that may be contaminated with PCB. Efforts to identify and remediate sites within the watershed should be continued and accelerated.

Human Health Candidate
Candidate Management Plan Recommendations for Actions in the U.S. Watershed:

Fish Consumption Advisories

1. 5-6. Continue to collect and evaluate fish contaminant monitoring data.

5-7. Review sediment and water quality criteria, and sediment remediation/mitigation measures, to assure that the bioavailability of bioaccumulative chemicals of concern is reduced to the point that fish consumption guidelines are no longer necessary.

2. 5-8. Expand ongoing outreach efforts to adequately inform the public, especially at-risk populations, about fish consumption guidelines

Beach Closures

United States: Beach closures due to high *E. coli* levels reached a peak in 1994 when a combination of significant volumes of sewage from multiple sources, warm weather, uprooted and shredded aquatic plants, heavy precipitation, and unfavorable wind prompted numerous swimming bans for Lake St. Clair beaches. While some consider this "worst case" situation to be a one-time event, others point to urban sprawl and an aging sewage system as major contributors to what they believe is an ongoing problem.

The wave of beach closures during the summer of 1994 resulted in significant efforts to locate and correct potential sources of contamination, particularly in Macomb County. These efforts led to elimination of many illicit discharge points and improved effluent treatment at wastewater treatment plants. This, in turn, led to an overall decline in the number of beach closures at most beaches between 1994 and 2002 (see Table 5-4).

Table 5-4: Number of Beach Closures for U.S. Beaches

Beach	1994	1995	1996	1997	1998	1999	2000	2001	2002
MACOMB COUNTY									
Metropolitan Park Beach	61	1	2	43	6	0	5	1	7
Blossom Heath Beach	41	28	67	5	4	6	51	3	1
Memorial Beach	39	9	84	39	16	4	24	4	2
New Baltimore Beach	6	0	7	0	0	2	2	23	38
ST. CLAIR COUNTY									
Chrysler Park Beach – Marysville	0	0	ND	16	6	37	3	7	54
Marine City Beach	0	0	0	ND	0	0	0	0	0
Marine City Diving Area	0	0	0	0	23	0	0	0	0
WAYNE COUNTY									
Crescent Sail Yacht Club	ND	ND	ND	ND	ND	ND	58	ND	ND
Pier Park	ND	ND	ND	ND	ND	ND	39	ND	ND

ND = No data available

Failing OSDSs, illicit discharges, CSOs and SSOs are key sources of bacteria contamination that must be addressed to eliminate beach closures. Feces from birds and animals are also thought to be a contributing factor. Efforts to address these sources of contamination should include:

- An ongoing routine inspection program to find and eliminate failing septic systems
- The treatment or elimination of CSOs and SSOs
- Community-wide programs to identify and eliminate illicit discharges
- Animal feces disposal/management

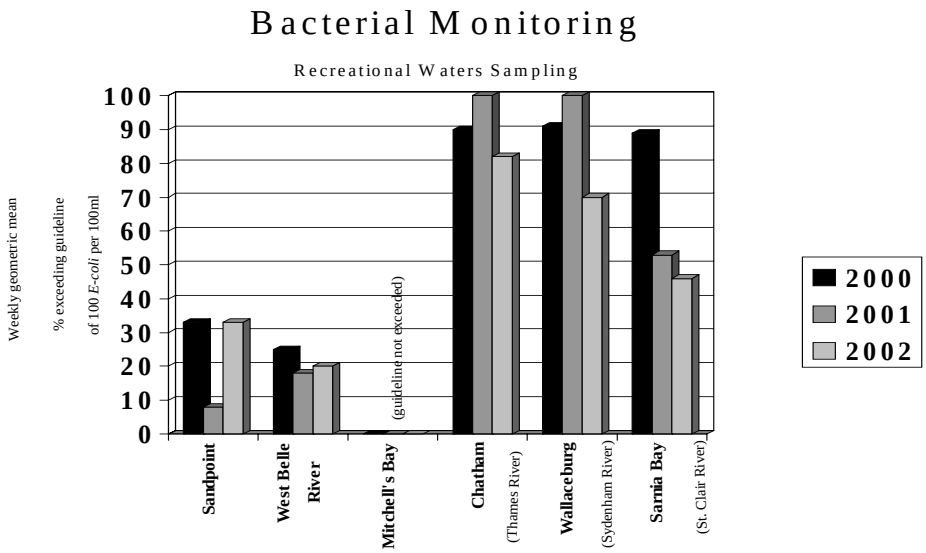
Canada: Beach closures continue to be a problem. Regular sampling of public beaches leads to public health warnings when bacterial counts are higher than the recreational water quality guideline. One exception is at Mitchell's Bay. At this site, located on the east shore of Lake St. Clair, there have been no incidents of high counts of bacteria over the past three summers. All other sites tested along the lake and river and in the watershed have had incidents involving high bacterial counts.

At the West Belle River and Sandpoint beaches on the south shore of Lake St. Clair, beach postings can occur several times a year. Nonpoint sources and urban development contribute to the problems at these beaches. There have been occasions when there were exceptionally high counts (over 1000 *E. coli* colonies per 100ml) during non-storm events with no known source for the contamination. It is suspected that discharges from boats are potential sources of contamination for these incidents.

Test results from the Sydenham River at Wallaceburg and the Thames River at Chatham normally exceed recreational water quality guidelines and signs have been permanently posted at these locations indicating that the areas are unacceptable for swimming. The poor water quality in the tributaries is attributed to nonpoint source pollution, including urban stormwater, failing septic systems, feces from animals or birds and agricultural drainage.

In 2002, Environment Canada undertook a program within the Sydenham River watershed to promote environmentally responsible livestock and manure management practices at farms in order to ensure compliance with the Fisheries Act. Environment Canada staff visited a total of 192 livestock farms in the Sydenham River watershed, between Strathroy and Alvinston, in order to give advice on how to comply with the Fisheries Act. Water samples were also collected in the Sydenham River from 8 sampling locations. During 2003/04, Environment Canada inspectors will follow up this compliance promotion work with inspections at farms that may potentially be in violation of the Fisheries Act.

Figure 5-2 Recreational Waters Bacteria Monitoring Sampling: % Above Guideline



The St. Clair River RAP identified beach closures as an impaired use in the St. Clair River AOC. Monitoring for the Canadian public beach at Centennial Park (Sarnia Bay) in Sarnia indicates that beach closures continue to be a problem. CSOs, failing septic systems and urban stormwater have been identified as potential sources of contamination in Canada. Reports issued in 1997 and 2000 by the St. Clair River Binational Public Advisory Council (BPAC) indicate that while this problem has not been corrected, efforts are underway to address these pollution sources.

Figure 5- 2 summarizes the results of Canadian recreational water quality monitoring and tributary monitoring and show the need to address the bacterial contamination that can impact water quality in Lake St. Clair and the tributaries draining into it.

Programs and Initiatives

United States: The MDEQ and U.S. EPA have initiated compliance and enforcement actions to address CSOs under the Clean Water Act and the Michigan Natural Resources and Environmental Protection Act. These programs have enabled significant CSO corrective actions, thanks to sewer separation projects and construction and enhancement of retention and treatment basins (RTBs). MDEQ has also been working with municipalities to identify and correct SSO discharges. These

discharges have generally been addressed through elimination of excess flows in the sanitary sewer system and providing additional capacity within these systems.

Under the provisions of the Phase II stormwater permitting program in Michigan, communities are required to develop and implement Illicit Discharge Elimination Programs (IDEP). These programs address the following:

- Elimination of improper connections to the storm sewer system
- Elimination of illegal dumping into storm sewers
- Minimizing the amount of seepage into the stormwater system from the sanitary sewer system and from septic systems.

Through IDEP, there are activities underway in Anchor Bay and the Pine River portions of the watershed to identify and remove illicit discharges. This program will be expanded to all municipalities along the lake and river shoreline in as2004 as the Phase II permit requirements are implemented.

Canada: Reducing and eliminating bacterial contamination from both point and non-point sources has been the focus of several programs in Ontario. Along the St. Clair River, both the Village of Point Edwards and the City of Sarnia have upgraded their wastewater treatment plants. The Township of St. Clair (formerly Sombra and Moore townships) extended sanitary sewers to eliminate discharges from failing private sewage systems. The City of Sarnia addressed combined sewer overflows in 1997 by constructing a storage tank to collect overflows from two of the four combined sewers that discharge into the St. Clair River. Sarnia will start environmental assessments for the remaining two combined sewers at Cromwell and Exmouth streets in 2003.

In other parts of the watershed, programs such as Healthy Futures for Ontario Agriculture (HFOA) has helped minimizing the effects of rural non-point sources of pollution through such activities as the enhancement of riparian habitat..

Human Health
Candidate Management Plan Recommendations for Actions In the U.S. Watershed:

Beach Monitoring

5-9. Require the elimination of all sources of untreated human sewage entering the waterways through

5-9.a. The development and implementation of illicit discharge elimination plans (IDEP)

5-9.b. Completion of combined sewer overflow (CSO) and sanitary sewer overflow (SSO) treatment and elimination programs

5-9. c. Detection and correction of failing on-site disposal systems (OSDSs)

5-9. d. Implement point-of-sale OSDS inspection programs to assure continued maintenance

5-10. Improve wastewater treatment planning, monitoring and permitting at the local level to assure that sewage is properly managed, regardless of the selected treatment alternative. Specifically, smaller systems must be properly sited, constructed, monitored, operated, maintained, and regulated. This would require:

5-10.a. Existing programs for permitting and siting on-site sewage disposal systems must be diligently enforced

5-10.b. Existing small package wastewater treatment plants and lagoon systems must be well monitored by state and local environmental officials

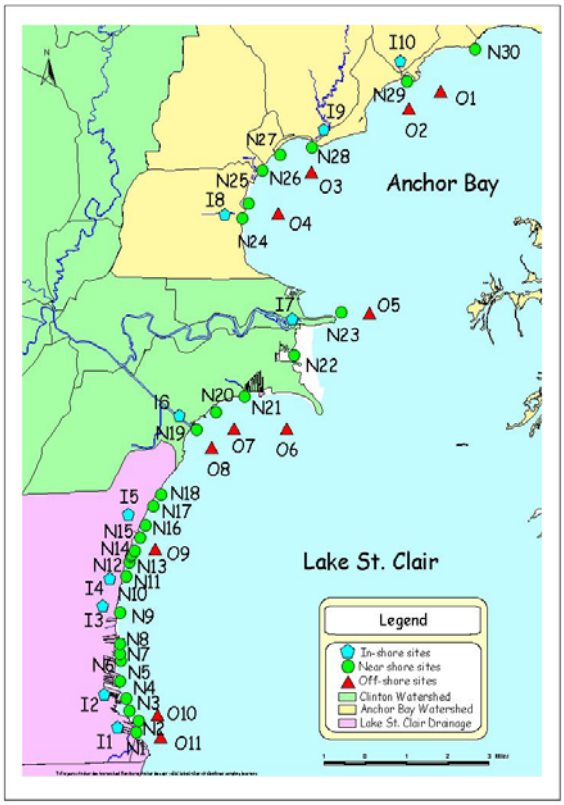
5-10.c. Current E. coli monitoring programs for drains and tributaries must be maintained and examined for possible expansion

5-10.d. Provide incentives for septage transfer stations and disposal facilities

5-11. Develop and implement an education and incentive program to assist local units of government in providing regional sewer service that would minimize the number of small local wastewater treatment plants, lagoons and onsite disposal systems

5-12. Evaluate the impact of wildlife, pets, and livestock on elevated *E coli* levels. Institute a regional bacterial source tracking system (BST)

Figure 5-3: U.S. beach sampling locations



Beach Monitoring and Assessment

Agencies in both the United States and Canada routinely monitor for *E. coli* densities within the Lake St. Clair watershed. However, there are limitations in the existing protocol for testing water at beaches.

The time required to complete the test (typically 24 hours), often makes the results difficult to evaluate and act upon in a timely manner. New techniques that determine *E. coli* readings specific to a given species and provide immediate results are needed.

Data confirms that beach closures occur more frequently following rain events; however, the cause of contamination is the subject of debate. Some experts suggest that wet weather causes sewer systems to exceed their capacity resulting in overflows. Other experts suggest that stormwater "washes" bacteria from the land and from within the stormwater collection systems. Data also show that *E. coli* reside in sediments within drainage systems and in beach sand, and then become resuspended during rainstorms.

This debate indicates that data must be analyzed to better understand long-term trends and to determine if increased beach closures due to rain events are the result of new or larger contamination sources or the result of existing contamination that enters drainage systems during rain events.

Programs and Initiatives

United States: In Michigan, county health departments collect water samples at beaches to determine if the water is safe for swimming. *E. coli* bacteria are counted and judged against standards established by the state. MDEQ and the Michigan Department of Community Health (MDCH) use guidance provided by the U.S. EPA to develop standards for *E. coli* testing (see Table 5-5).

For more information...
Current updates and historical data sets for *E. coli* analysis within the U.S. portion of the watershed are available at www.deq.state.mi.us/beach

The beach at Mitchell's Bay is sampled by the *Chatham-Kent Public Health Services* and results are posted on a web site at www.city.chatham-kent.on.ca

The West Belle River and Sandpoint beaches are sampled by the Windsor-Essex County Health Unit and results are reported on their web site at www.wechealthunit.org.

Centennial Park sampling results are reported by the Lambton Health Department at www.lambtonhealth.on.ca.

Table 5-5: Water Quality Standards for *E. coli*

Jurisdiction	Geometric mean of five samples taken over thirty days	Single Sample Maximum
U.S. EPA	126 CFUs/100 ml*	235 CFUs/100 ml
Michigan	130 CFUs/100 ml	300 CFUs/100 ml
Ontario	100 *E. coli* per 100 ml (geometric mean of five samples taken in one day at a sample location)	

*colony-forming units

County health departments monitor beach water at least once a week during the summer to determine if the water is safe for swimming. If a beach is closed due to bacterial contamination, health departments will continue to monitor water quality and will permit the beach to reopen when bacteria levels fall back within acceptable levels. It is possible that a beach could be closed for swimming but other non-swimming recreational activities at the beach may still be available. The locations of the beaches and other sites monitored on the U.S. side of Lake St. Clair are shown in Figure 5-3. The test results at these locations often exceed the acceptable recreational water quality guidelines.

Increased public concern about bacterial impacts on public beaches led the U.S. government to pass the Beaches Environmental Assessment and Coastal Health Act (BEACH Act) in 2000 as an amendment to the Clean Water Act (CWA). This law, administered through U.S. EPA, requires

- States to adopt new or revised water quality standards for pathogens and pathogen indicators;
- U.S. EPA to study issues associated with pathogens and human health, then publish new or revised criteria for pathogens and pathogen indicators; and
- U.S. EPA to award grants to states to develop and implement programs to monitor beaches and notify the public if water quality standards for pathogens and pathogen indicators are exceeded.

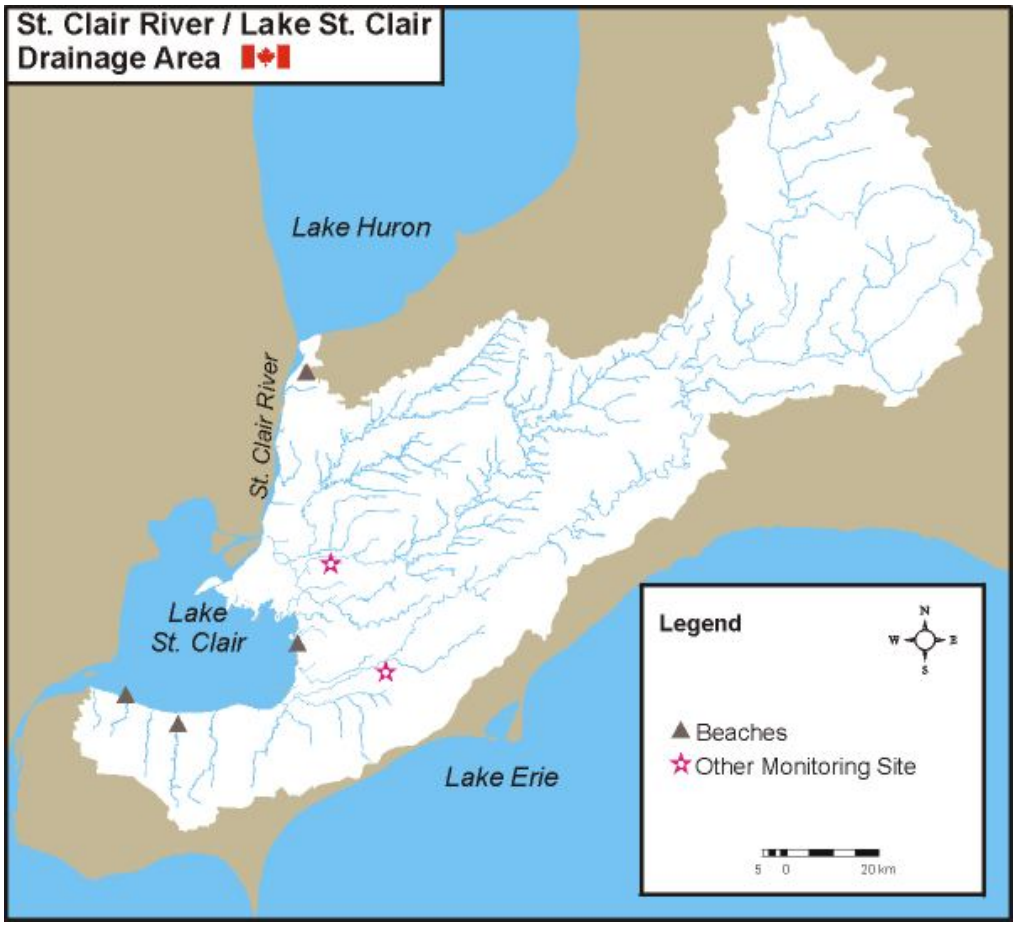
Canada: In Ontario, the Health Protection and Prevention Act provides for the organization and delivery of public health programs. Local municipalities establish a Public Health Unit or Public Health Department as the official agency to provide a wide variety of community health programs, including monitoring of public beaches. Under this act, the OMOE and the Ontario Ministry of Health (OMOH) have jointly set a recreational water quality guideline of 100 *E. coli* colonies per 100 ml of water as a standard for recreational waters (see Table 5-5).

OMOH provides a protocol to assist local health agencies to determine which beaches should be sampled and a standard procedure to evaluate water quality. Local health agencies monitor water quality each week throughout the summer to ensure public health is protected and warnings of unacceptable bacterial levels are posted. In addition, local health agencies usually warn the public about the potential for high bacterial levels following rainstorms or when heavy wave action makes the water cloudy. The locations of the beaches and other sites monitored on the Canadian side of Lake St. Clair are shown in Figure 5-4.

The Essex Region Conservation Authority monitors tributaries discharging into Lake St. Clair. The Chatham-Kent Public Health Division also routinely samples the Sydenham River at Wallaceburg and the Thames River at Chatham. This monitoring

provides background information on water quality for the major Canadian tributaries discharging into Lake St. Clair.

Figure 5-4: Canadian beach sampling locations



Binational: The St. Clair River RAP identified beach closures as one of the impaired beneficial uses in the St. Clair River AOC. The 1997 and 2000 RAP progress reports indicate that this problem has not been corrected. CSOs, failing septic systems and urban stormwater have been identified as problems in this area. The only Canadian beach routinely sampled in the St. Clair River AOC is at Centennial Park in Sarnia.

Human Health
Candidate Management Plan Recommendations for Actions in the U.S. Watershed:

Beach Monitoring and Assessment

5-13. Continue research into more timely and cost effective strategies for early detection of beach closures and predictive models for beach closures

5-14. Implement the Beaches Environmental Assessment and Coastal Health Act (BEACH Act)

Conclusion

The Lake St. Clair-St. Clair River watershed has historically been a plentiful source of high-quality drinking water. Water quality in this region faces potential problems with contamination due to pollution from various point and nonpoint sources. Water quality in the lake is particularly susceptible to weather fluctuations because of its large surface area and very shallow depth. Programs designed for early detection of contamination, spill prevention, and rapid spill response can protect the drinking water quality in the region. Programs to reduce contamination from point sources and nonpoint runoff are essential in maintaining high water quality. Additionally, the continuation of studies designed to better understand how contaminants move throughout the lake are important in anticipating and responding to water quality threats.

Fish consumption continues to be problematic within the watershed due to elevated concentrations of mercury and PCBs. These contaminants enter the Lake St. Clair basin from a number of sources, ranging from present or historic local releases to long-range air transport from distant sources. It is believed that the majority of these pollutants currently reaching the watershed are deposited after travelling long distances in the air. These pollutants are persistent in the environment, being eliminated very slowly. Once in the system, these pollutants accumulate in sediments and bioaccumulate through the food chain, reaching dangerously high levels in the larger predatory fish. Localized discharges of these materials need to be isolated and eliminated to reduce watershed inputs to the maximum extent possible. Support is needed for efforts to reduce emissions of these pollutants on a national and global scale. Finally, public outreach programs are needed to educate area residents about fish consumption advisories.

Beach closures due to elevated bacteria levels continue throughout the watershed. There are many sources of bacteria within the watershed, including illicit discharges from failed onsite disposal systems, CSOs, and SSOs. Remediation of these major sources of contamination is the most important step in addressing the beach closure problem. Current detection methods for biological contamination are inadequate due to long test periods. Development and application of reliable, rapid contaminant detection methods is needed to ensure healthy recreational opportunities at the region's beaches.

The St. Clair River and Lake St. Clair are vital resources to the hundreds of thousands of people who depend on it for their drinking water, as a food source and for recreation. It is essential for their wellbeing that these water resources are capable of providing these services in a safe manner. Contamination of the river and lake with disease-causing microorganisms and persistent toxic chemicals has become an important threat to the health of people living in this region. Through elimination of pollutant discharges, improved monitoring and detection, and effective communication with the public, these threats can be minimized.